

Abstract of the Disclosure

A multi-layered barrier metal thin film is deposited on a substrate by atomic layer chemical vapor deposition (ALCVD). The multi-layer film may comprise several different layers of a single chemical species, or several layers each of distinct or alternating chemical species. In a preferred embodiment, the multi-layer barrier thin film comprises a Tantalum Nitride layer on a substrate, with a Titanium Nitride layer deposited thereon. The thickness of the entire multi-layer film may be approximately fifty Angstroms. The film has superior film characteristics, such as anti-diffusion capability, low resistivity, high density, and step coverage, when compared to films deposited by conventional chemical vapor deposition (CVD). The multi-layered barrier metal thin film of the present invention has improved adhesion characteristics and is particularly suited for metallization of a Copper film thereon.